

MICHIGAN
TECH
NICS
·PYRO 18·

PERPETRATED
LARGELY BY

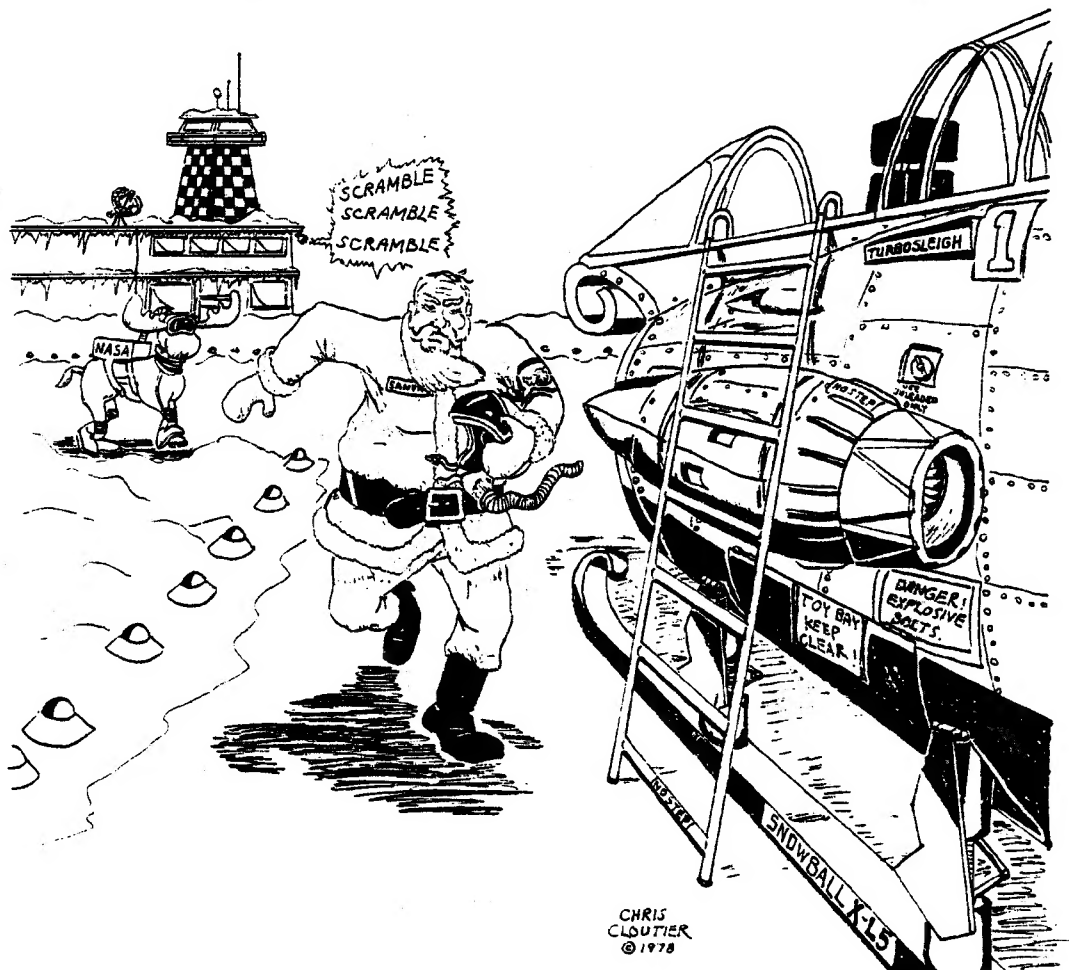
AL DEUSTER



GENERAL
TECHNICS

MERRY

CHRISTMAS !



SOAPSUDS

75 Years ago, good old Orville and Wilbur got their crate to buzz along for a ways without touching the ground, thus digging themselves a cozy nitch in history.

Next year, if all goes well, NASA is going to get the Shuttle zipping along without touching the air, thus signalling the Grand Opening of the Space Age. Of course we've been out there, stomped around on the moon, sent some complex gadgetry out towards the stars, and put a lot of different things in orbit. Many of these things have effected a change on human society that is so vast we can hardly pick out something that hasn't been touched. Don't get me wrong. The Space Age has been around for a while.

It's just never had a Grand Opening.

Like a new supermarket, you only get a few customers at first. Put flash the signs and wave the flags saying "Grand Opening - reduced prices - tremendous bargains!". And even Grandmother, who's been shopping at Ed's Country Store all her life, will come into the new place. Convince the people who come that they'll continue to get good deals, and you can be pretty sure that they'll be back in the future. The big thing about the Shuttle is that its reusability cuts the cost way down. And to Industry, that's important.

American industry is geared for making money (although by looking at it you might think its primary purpose was to waste and make waste). Anything that the management sees that could save a few cents here or a few cents there is sure to catch their interest. Saving just a penny on the production of a chip can tally up if you consider that yearly production may approach the millions. Many an engineer has found a fat bonus check waiting for him after having an idea that saves the company several thousand \$s. And why not? The reward system works almost as well on people as it does on dogs. The proposal must be cost-effective, though, or it will go right down the tubes.

Therein lies the problem. NASA has to convince Industry that its initial investment in space will be more than paid back. So far, they have been doing pretty good. But anything that is new and untried will be shunned. The old and sure-fire methods will prevail. That is, until someone gets bold, takes a chance, and has it really pay off. Then there will be a rush as everyone tries to get on the bandwagon.

The competitive edge that space can give an industry is enormous. Once industry as a whole realizes that, the ball is off and rolling. The old "corporate lust" will get us into space. We just have to make sure it doesn't control our getting into space.

It's slightly similar to a puddle of gasoline. If you leave it alone, it will just evaporate, but if you get one spark near it, whoosh! There are enough people who like to play with matches. All we need are some dedicated arsonists. After all, Pyrotechnics is the name of the game.

0101010101010101


MOOSESEKLINE
CHRIS CLOUTIER '78


MICKEY MESKIN
GUESS WHO... '78


BILL WINKLE THE MOOSE
2

POWER!

- or -

Building a Krell reactor for fun and profit in the privacy of your own basement.

by Todd Johnson

A blaster should be equally deadly-looking whether idling on your belt or actually devastating a corner of the con suite. The case design is of much importance in drawing attention, but electronics specifically for "stand-by" operation have the potential for transforming a "cold" (albeit wicked looking) blaster into a device which fellow Fen will know is deadly.

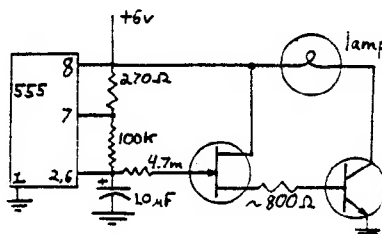
A simple solution would be to use a few blinkin' LED's driven by a 555 or 3909, depending on how you were brought up (You forgot the neon relaxation oscillator for the "older" generation! - Al). Blinkinlites give forth a computer-like aura, which may or may not be what you want for your weapon. However, a weapon that pulsates with an eerie glow (something I call the Krell effect for obvious reasons), would be much more effective in giving the impression that your device is powered by direct mass conversion.

To implement this effect, which consists of merely brightening and dimming a lamp every few seconds, I resort to a FET (I love 'em, I really do) (no comment - Al). As shown in the schematic, a 555 is used as a source of triangle waves (almost), which are observed by the FET and converted to a current to drive the transistor lamp driver. The 800 ohm resistor is about optimum for a Christmas tree bulb, but for other bulbs and LEDs, this value will have to be altered to get the right bias - for instance, LEDs require about 50K on the base of the driver. The FET can be almost anything - HEP 301, 2N3819, etc.

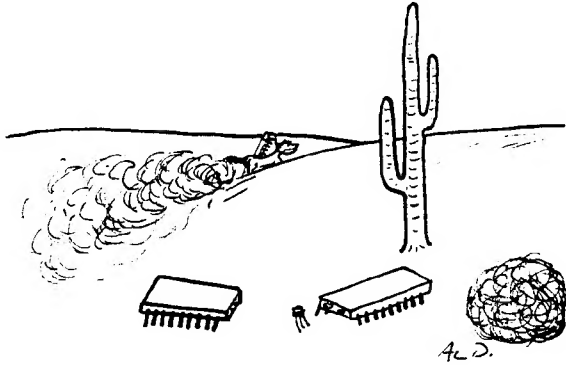
Note that pin 3 of the 555 is not used. It can still be used to blink an LED, clock some TTL, or drive a monode if you don't have anything better to do.

Whatever you decide to drive with this circuit, keep in mind that it will be on a good portion of the time, using up your precious amp-hours. So if you're using AA ni-cads, don't expect to be able to pulse a 6 volt flashlight or car taillight bulb for more than a minute before having the whole thing go dead right in the middle of your big demonstration.

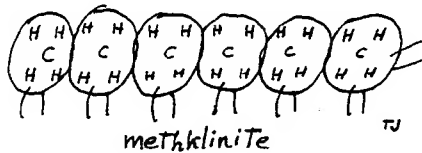
Unfortunately, the AC version of this thing hasn't gotten off my clipboard yet, and the deadline is upon me. So much for a Krell Christmas tree, or how about a Krell IDS tower? "You see," his mentor explained, "your powers are limited only by those of your triac...."



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Who was that masked ROM? I don't know, but he gave me this epitaxial mosfet.



CHAMBANACON

Hats off to the folks who put on Chambanaccon, for a very enjoyable convention. My congrats also to the Ramada Inn who put up with us. I couldn't find fault with their services (the miniature elevator was rather interesting), nor did I hear complaints from others.

GT was in abundance at Chambanaccon. Appearances seemed to indicate that 10% of the con members were GT members. For those of you who weren't there, let me return to those days long past.

It all started on a crisp, clear day. We found that the average speed on the mid-Illinois interstate was about 120 KPH. While in transit, we gazed upon the brown, dry fields, secure in the knowledge that Houghton lay under a peaceful meter of white fluff, and that the return trip would be uneventful. Arriving at the hotel, our scanners detected Tullio and Renee in the Con suite, Renee clutching her bottle of Chloraseptic (which came in pretty handy, as lots of folks were getting sore throats. The big question seemed to be; who's got the bottle?). Unaware at the time we were, that Tullio had not brought his wares to huck, but had been part of a larger, universal plan. What that plan was, we still don't know.

Grape/cyanide Kool-Aid jokes were flashing about for the better part of the day, and in the early evening a large, white ovoid appeared in the Con suite with the inscription "Rover Had Pups" on its side. The evening continued with the usual gaiety and mirth, with Mr. Bill (Higgins) making a surprise appearance. At around 11 the pool opened, and the GT pool party got underway. A small party it was, as most members had neglected to bring swim suits. INTERJECTION***Always bring a suit to the cons you go to. Buff bathing might not be approved of (there were two glass causeways/halls going right by the pool at the con), and you never know what might happen. At Minicon a group of us almost went to the hotel across the street for a pool party. ***END INTERJECTION. Jeff, after a few

minutes in the whirlpool (see what you missed), decided that he wanted one for the basement. One way, no doubt, to assure that the walls would burst asunder at future parties. Susy the Lifeguard and Steve the Johnson were both making appeals to the heavens for massive quantities of snow at the time. Susy so she could get snowed in, and Steve because it had snowed at all the previous Chambanaccons, and he wanted it to be a tradition.

With the group of techies being the size it was, there naturally had to be a scrounge run. Going by information provided by the locals (As well as a McDonalds, the Concom had thoughtfully arranged to have a Byte Shop built across the street from the hotel), a group of eight of us found our way to Central Data on Saturday. Unfortunately, rooting around in their garbage produced only a documentation pamphlet on their 64K RAM board. In the dumpster next door, however..... Timers, IR heater lamps, TV tuners, bottles of Loctite, even an ice maker! GE had thoughtfully provided a service center which dumped a lot of stuff on Friday. Half the junk was in unopened boxes!

That afternoon, the GT meeting convened. A short recap follows. The paper fund is doing OK, but keep sending bucks to Jeff, especially those of you who haven't. Those of you who haven't picked up a copy of Starlog or Future lately may be interested to know that they are sponsoring a "Getaway Special" on board the Shuttle. Some person or group will be selected to fly their experimentation package on a flight. There are some limitations: it must weigh less than 200 lbs. (90.7 Kg); it must be started by no more than three commands (on/off) from the Shuttle crew; maximum size is 20" diameter (50.8 Cm) x 40" length (101.6 Cm); it will not leave the Shuttle bay; it can be open or sealed. There are others, and I would suggest getting a copy of one of the magazines to get them. We, if anyone in fandom, should at least be able to get in several good proposals, if not the flight space. Brainstorm! Send your proposals in to Jeff. He offered to print the good ones, and we can decide from those which we think is the best, and which has the best chance of winning. We can send in several if we so desire. Two suggestions made at the meeting were: Pigs in Space and; we show Senator Proxmire the wonders of orbital flight. I have been asked to write up the last one and send it in to humor the editors of the magazines, and I shall. Rest assured that GT will not be mentioned. So, sit down right away and get the ideas coming. The deadline for entries is July 20, the anniversary of the first moon landing. The meeting ended with distribution of the goodies left from the scrounge trip, and my trying to trade/sell electronic parts (Clyde, we've got to synchronize this! Are you going to Confusion?).

The fun continued in the evening with a ranquet at the China House restaurant in Rantoul. We ordered dinner for a million, and were treated to a long wait for food. I put the time to good use by snatching mesklinite cartoons from Phil Foglio and Martha Soukup (The 'toons are printed in here for the world to see, though I had to redraw them from the napkins and placemats.). Ewing made the 20 mile trip enjoyable with his comments about giant grasshoppers from a B movie munching the tops off of grain silos in Rantoul.

I would highly recommend the con for a spot on your calendar next year. The fact that it is held on Thanksgiving makes it easier for those of us who have vacation to get to it, but interferes with plans to stay with the folks for the weekend. I think it works well happening when it does.

Jeff, why don't you tell the folks of the upcoming adventures of Cosmo Klein, as Higgins calls it, "The only robot in the world able to crush his hand with a bare beer can!".



THANK YOU, CAPTAIN AL

WOW. I'm impressed. Damned fine job, people. Let me point out that every PyroTechnics needn't be as pyrotechnic as this one. Do the best you can, but, what the hell, I hadn't expected anything quite like this.

Marvelous.

You eskimos up there have done me a tremendous service. For the last month I've been devoting just about every spare moment to refurbing Cosmo, because, in case you hadn't already heard, my mechanical shadow and I have made the big time: We're going to be in a national news magazine.

It all started last September 9, when a little filler article about robots was published in the Wall Street Journal. I'll try and reprint it next issue. It mentioned a number of robots across the country, most especially including Elsie Twosie and Cosmo. I recall having been interviewed for that article by a guy named Dick Shaeffer, who I imagined as hunching over a 1914 Royal typewriter with a pork-pie hat cocked over one eye and a cigaret hanging out of the corner of his mouth. He was typing my answers as I said them, and wow, could I recommend a good electric typewriter...

Anyway, I sighed and chalked it up to my eternal hatred of organized labor when the moron pressmen's union went on strike and shut the papers down, not realizing that the Journal was not involved. It was not until a reporter for the about-to-be-resurrected Look magazine called me to say she was coming down to Chicago to photograph Cosmo, Carol, and I, that I realized my mistake. I had yet to hear of the Journal article. It was a rude awakening.

The ensuing month saw Cosmo's face evolve into a pretty sophisticated graphics animation system. His eyes roll, blink, and shift from side to side. Periodically he makes an awful face, similar to how mine might appear upon eating triacs pickled in ferric chloride or opening a property tax bill. In addition, I can command him to lick his chops by radio control.

I also licked a few of the problems plaguing his arm mechanisms. By moving the arm away from the body about an inch and a half I enabled it to turn 360 degrees. Also, by careful balancing of the arm around all three axes I made it possible for the little DC motor to raise and lower the arm through any angle, even with a considerable weight gripped in the hand.

The Look people were delighted when they met Cosmo Saturday the 9th. They had definite ideas of how they wanted to photograph him. Realize that Look in its reincarnation will be something of a cross between People and Time, and technical accuracy must bow to "human interest". The reporter had contacted a local photographer and asked to rent his studio for an hour or so. We dismantled Cosmo and trucked him down to Harry Hoyt Picture Post, where we reassembled him and sat for an hour and a half while Look photographer Dan McCoy shot close to 200 exposures of "The New Family Unit." The photos are generally of Cosmo, Carol, and I posing for studio owner Hoyt's enormous wooden studio view camera, including Hoyt with a cloth over his head and a rubber bulb in his outstretched hand.

I imagine the pictures will be beautiful. They don't show poor Harry Hoyt tripping over an extension cord and dropping a \$400 color reduction filter onto the floor, where it became a pile of pretty pink shards, nor do they indicate the fact that my ass kept falling asleep from sitting on that hard horse-hair bench. Cosmo, of course, is a born ham. He had a good deal less trouble holding a smile than the rest of us did.

The reporter then suggested that we hold a birthday party for Cosmo. What the hell. I called a number of local GT types and told them to truck on down. I got hold of my sister and told her to try and come up with a cake. To my surprise, she showed up an hour later with a terrific fudge number with HAPPY BIRTHDAY COSMO on it, and a cake-icing drawing of Cosmo executed by

Doug Van Dorn, my intrepid brother-in-law. Snap, snap, snap went McCoy's camera, and with a little luck Bill Colsher, Michelle Colsher, Bill Higgins, Angel Insley, Gretchen Van Dorn, Doug Van Dorn, Carol, and I will all be smiling for the camera in an early issue of Look magazine. The first issue will be out February 5. We may be in it, and may not. Watch for us!

Rumor has it that Pyro 19 will follow hot on the heels of this one, if our Champaign-Urbana crew can keep their Diablos pumping. That should give me time enough to recover before having to do another one myself.

I'm looking for information on a computer called the Exidy Sorcerer. Anyone seeing any articles or data on this beast let me know where it can be found, or else pinch off a copy and send it by. I'd appreciate it.

So, in closing, let me extend all my best to all of you from Carol and I and our New Family Unit. This coming new year, learn something you never knew before, be kind to someone you never spoke to before, build something you never built before, and strive to grow more fully human than you ever felt before. Merry Christmas, Happy Hanukkah, Peace, Love, Shalom, my friends. Thank you for caring about us and about each other within the GT community.



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that...)

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Nostalgia, anyone?



Four-function unit adds, subtracts, multiplies, and divides. At right, a wooden mockup. Major components include a 40-pin, two-chip ceramic package, an eight-digit liquid-crystal display, and a keyboard with associated printed-circuit board.

Look—A \$100 Mini-Calculator!



A pushbutton bombshell is scheduled to explode this month: a compact, fully automatic electronic calculator priced around \$100. The 2½-by-7½-by-3¼-inch, eight-ounce calculator should be the first "personal-use" unit priced low enough to tap the huge market of students, salesmen, technicians, housewives, and income-tax payers. To date, calculators with similar capabilities have been discounted to about \$200 [PS, June '71, p. 74].

At Ragen Precision Industries (9 Porete Ave., North Arlington, N.J. 07032) two months ago, I held the calculator's electronics in my hand: some components were still being engineered for the production line. But RPI's president, I. I. Lopata, was confident that announced deliveries of 20,000 calculators to Alexander's, a New York department-store chain, could begin in January.

The 2½-by-7½-inch liquid-crystal

readouts [PS, Oct. '71, p. 73] will show the first eight significant digits in the answer, with the floating decimal point automatically placed. Later models may have a switch to display eight additional digits—separately—which the 0.2-inch-square, large-scale integration chips compute anyway.

How do they shrivel both size and price? RPI's semiconductor division will make both the displays and complementary metal-oxide semiconductor (C/MOS) chips. This combination needs only a minute trickle of current (10 micro-amps), so the calculator can operate one year on two tiny, specially designed six-volt batteries—the only major component not made by Ragen. You'll know it's time for new batteries when you push the CLEAR key and don't get all zeros. Assembling the parts will apparently be a simple operation. This should be the first application of C/MOS for a consumer product.—J. R. Free

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LIGHT READING — A FIBER-OP PRIMER

By Cathy Hudson

What? You say that you can fit your home-made microprocessor system into the rec room, but the cables snaking away to the new Heathkit Bed Headboard and Computer Terminal won't fit within the drywalls? And threading it through the halls simply ruins the decor, not to mention presenting a grave shock hazard when you have to go to the bathroom in the middle of the night?

Is that what's got you down, bunky?

Well, realizing just what an imaginative mind you have, you decide to exercise the thinker. With a flash, fiber optics comes to mind, in 20 foot glowing neon letters. Of course, you just happen to have a pair of IR lasers lying around that you

haven't used since you accidentally let them cold decompose your a-vinylclohexane to budadiene. So you call up the Siecor man and tell him the poor-hunger-stricken-genius-student-at-a-cruel-re-strictive-university story, and he agrees to give you twenty feet of cable.

"Sure, what kind do you want: step or graded, how many waveguides, what range of bandwidths, attenuation requirements, etc.?" As he rambles on, you begin to think that there are more parameters to a cable than sesame seeds on a Big Mac. Slowly, but surely, you lower the phone receiver into its cradle, hoping that the man will think you were disconnected.

Where do you start? Hopefully, this article will help. Call it the light at the end of the tunnel, if you like. It isn't especially deep, but it should serve to introduce you to the subject.

A basic fiber is made of two layers of glass, one with a higher refractive index than the other. Light "bounces" between these two layers down the fiber, making it a good transmission medium. A simple fiber-optic transmission set consists of a transmitter, usually a CW diode laser (notice how no one capitalizes that word anymore? And it's only been around a few years. — Al), or a Ga-Al LED; a receiver, consisting of a PIN or avalanche photodiode, and, of course, the fiber itself, along with any needed couplers. Optic cables are most effective/efficient in the infrared end of the spectrum (say about 850 nm), but if you're the type who just has to see the light go blinkety-blink at the other end, at least use a red LED.

There are two basic types of index fibers: step and graded. A step index fiber consists of two distinct layers of glass, called the core and cladding, respectively. It has an abrupt change in refractive index at the boundary between the slightly dissimilar materials. The change is only on the order 0.01 (That's not a percentile difference, but a variance in the refractive index, which is a constant with no units associated with it. — Al). In comparison, a graded index fiber has a refractive index that gets progressively lower away from the center. This quality makes graded index superior to step index fibers in high-speed data transmission systems. The reason for this is that the "bounce" caused by the step fiber makes some waves travel farther than others, thus increasing the time needed for a wave to travel down the fiber. A graded index fiber, on the other hand, constantly refocuses the waves toward the center of the fiber. This means a shorter path is obtained than by "bouncing" the waves. The end result is less spreading of the output pulse by the time it reaches the receiver (see the diagram below for a graphic illustration). As you can see, if the output pulses are spread too much, a series of high speed pulses could get run together, sending your poor data bus into permanent glitchdom. If anyone is interested in a more in depth examination of the physical properties of these fibers, I'd like to recommend "The Fiber Lightguide", in the May 1976 issue of Physics Today.

The type of dispersion I've just covered is called Modal Dispersion. The second type of dispersion lies within the source (transmitter) itself. The velocity of an electromagnetic wave varies with the refractive index of the medium it is traveling through. The equation for this is: actual wave velocity = C / refractive index. Also, different frequencies have different velocities in a fiber. An LED has a bandwidth of about 350 Angstroms, while a laser has one of about 20. Therefore, a laser produces a lesser amount of distortion (via spreading, although for a different reason) than an LED. However, don't go out and buy yourself a B RCA-C 30127 CW laser diode to solve this problem unless you want to buy some very expensive couplers, do some very exact coupling, and make a cooling unit for the laser. You see, lasers have this very nasty Power vs. Current characteristic which happens to be temperature related (Did I hear an echo of "thermal runaway!"? — Al). Stick to the LEDs, please.

So you decide that nothing's too good for your digital child, and dip your fist into your rainy day piggy bank. A few couplings here and there, and voila! You have a high capacity system, lasers and all, ready to support your moderate capacity load. So you think, why not buy a little extra cable and connect up to your Rocky Mountain workshop retreat. No hassle, eh? Wrongo. Your signals will never reach their destination because of light losses (alias attenuation).

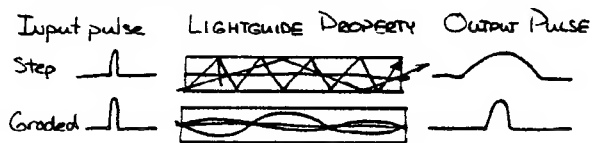
Optic fiber systems are not perfect (is anything?). Losses occur in several ways. To illustrate graphically, let us suppose a laser gives off 10 "rays" of light. One of the rays approaches the input face at such an angle that it is reflected back into space instead of entering the fiber. This type of loss is called Fresnel Reflection, and is due to the difference in refractive indices between the fiber and the medium, be it air or some other material, in which your source is immersed. Another ray approaches at an angle from which it would normally be accepted into the fiber, but because of an imperfection in the face of the fiber, it is reflected. A third ray is reflected due to a misalignment between the source and fiber.

The seven remaining rays enter the fiber. In traveling down the fiber, three more rays are lost. The first is lost through light leakage, caused by imperfections between the different layers of glass (with different indices of refraction) within a fiber. It refracts from the boundary at an angle that shoots it totally out of the fiber to be absorbed by the protective PVC jacket surrounding the fiber. The second ray is lost through absorption by impurities in the fiber material. The third ray is lost because of small non-homogeneous areas in the fiber material, called microheterogeneities. These differ from impurities, in that they are the same material as the rest of the fiber, but in a different state, like a crystal that didn't dissolve into the original melt. Finally, three more rays are lost leaving the fiber, in the same manner as the three lost entering the fiber. In the end, a lone ray enters the receiver, only to be ignored because the luminous energy it provides is below the sensitivity threshold of the receiver! It's enough to drive a techie to tears.

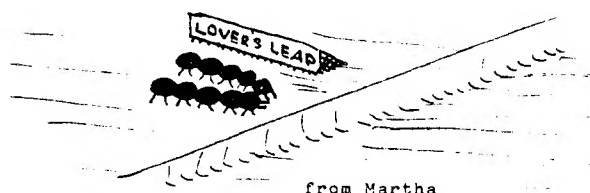
So, for the moment, private, longrange transmission is out, unless you want to reconstruct your signal every 14 km. (Let's face it, if you can afford 14 clicks of fiber, a reconstructor is no problem! - Al).

If anyone out there wants a more in-depth explanation, or additional information, drop me a line and I'll try to answer your questions, or refer you to some articles that can. Meanwhile, try some "light" technical design for once - I'm sure you'll enjoy it.

GRAPHIC ILLU. OF DISPERSION IN FIBERS

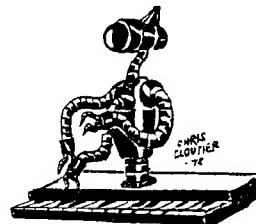


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MUSIC OF THE SPHERES

There's a good chance that if you're listening to any audio program material at this moment, a large portion of it is done with the assistance of synthesizers. These wondrous machines have the capability to generate sounds heretofore unknown to man. Most everyone is aware of their ability to create almost any possible sound imaginable, and some that aren't. Not too many people know how they do it, though, so I'm going to spend a little time and learn ya 'bout 'em.



Many people say that a synthesizer cannot form a sound that is expressive, or rich enough. While this is true in some cases, more often than not it is the fault of the performer rather than the machine. Some machines (notably the low priced ones) are limited, of course. Let us not forget, however, that we have only had synthesizers on the face of this planet for the last 15 years. While that may seem like quite a long time to you, remember that we have been trying to develop an interface between man and machine that can convey emotion. Older, "traditional" instruments solved this by mechanical means, such as pressure or pedals, or, in the case of wind instruments, by assistance from the performer's voicebox. The electronic instrumentation needed to perform these control functions is complex, and pretty expensive. Work in the field is advancing capabilities in that direction, because the controllability aspect is the most important one in synth design. The synthesizer is finally starting to mature as an instrument, instead of an electronic toy (Of course, using it as a toy is the most fun thing about it. I have a great time on Halloween.).

Additive synthesis is the process of starting with zilch and adding the harmonics you need in the desired ratios. Since most of the interesting aspects of sound are functions that vary with time, the control problems can get quite complex.

Digital synthesis is the process of generating the exact waveform you want, point-by-point, from a program or data in a computer. This is great if you happen to own a PDP-11, or other micro/mini, and know how to design long, complex, software routines (or you know where to get them).

By far the most popular form of synthesis is the subtractive method. It's the most popular because it's cheap, easy to use, and can still give an unlimited (well, almost) number of different sounds. This, by the way, is the way the TI SN76477 Complex Sound Generator IC works. I'll leave the chip specifics for Jeff's article, as I haven't diddled with one yet. As its name implies, in subtractive synthesis, you start with a waveform, or group of waveforms, and whack out what you don't want.

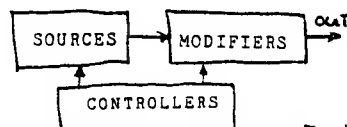


Fig 1

Take a look at figure 1. All subtractive synthesizers (if not specified, it's usually subtractive synthesizers being talked about) are composed of three basic types of modules: sources, processors or modifiers, and controllers. Their names are self-explanatory, and they are usually configured as shown for what is termed a "basic patch". A patch is a specified pattern that the modules are connected in, along with the initial state control settings needed to end up with a finished sound. The key to the synthesizer's versatility is voltage control (abbreviated VC). Controllers all put out a control voltage and/or timing signals. The voltage put out by the most common controller unit - the keyboard - is

proportional to the key pushed. The higher the key is, the greater the output voltage will be. Other controllers can be configured differently. They range all the way from guitar-type down to just a potentiometer. The reason voltage control is so important is that you can not only use the output of the keyboard to control frequency through a voltage controlled oscillator, but if you so desire you could control amplitude through a voltage controlled amplifier. I'll get back to controllers later.

Under the heading of sources, we have voltage controlled oscillators (VCO) and the noise source. The VCO is the heart of the system. It provides the starting waveform for the synthesis procedure. Its frequency can be varied, on a good synthesizer, from subsonic, where its output can be used as a control signal, to ultrasonic, where it can attract dogs and mosquitos. Most VCOs have multiple outputs with a variety of waveforms. This is because different waveforms have different harmonic structures - some have all odd harmonics, others have all even, and others have mixes of the two. The noise source is used as the starting sound for effects such as thunder, explosions, rain, wind, waves, etc. Usually the noise source has both a white and a pink noise output. White noise is produced by random fluctuations, and it contains equal energy at all frequencies. Pink noise has an equal amplitude distribution per octave, and is often claimed to be more useful in music. White noise sounds somewhat like hissing steam; whereas pink noise sounds more like distant thunder. On some units, the noise goes through a low-pass filter to become a slow, random voltage, which is useful as a control voltage in teapot and wind effects.

Modifiers include filters, mixers, amplifiers, and a bevy of gadgets like reverb, echo, flangers, and phasers (not the ST kind).

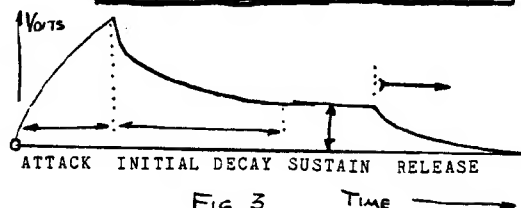
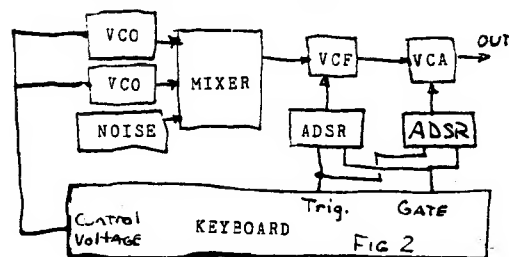
The VC filter (VCF) is the harmonic controller in the synthi. It can cut out the high or low frequencies (remove harmonics or fundamentals), suppress frequencies in a narrow band, or allow only frequencies in a narrow band through. These different functions are known as low-pass, high-pass, notch (or band reject), and band-pass, respectively. The filter cut-off frequency is the main parameter that is voltage controllable, although on more complex machines the "Q" (resonance) can also be voltage controlled. You can see that if you put noise into the filter, and had it in band-pass mode, sweeping the input control voltage from low to high would give a THHWISSHHHHIII. The Photon torp launch sound on Trek is another close example. Simplified, you have a VCF that has its resonance boosted to the point where it is almost self-oscillating (Those of you who noticed that boosting it high enough will start the filter oscillating so that it can be used as a source, give yourselves a pat on the back). Any noise sent through the filter (still in band-pass mode) will "ring" the filter at the frequency set by the control voltage. Noise in, sweep the filter up, and another Klingon finds his body temperature rising to stellar temperatures.

The VC amplifier (VCA) is used for controlling the amplitude of a signal. This can be either an audio signal, or a different control signal. Usually the output of the VCF is run into the VCA, from where it goes to the external world.

Mixers are usually used to mix a number of VCOs together for a richer sound, or at the end to mix the outputs of several synthesizers together. The other modifiers are not usually found on the synthesizer but come separately, so I won't cover them here.

Back now, to the controllers. The envelope generator, called ADSR for short, is a type of automatic controller. ADSR stands for the four phases of the output envelope: Attack, Initial Decay, Sustain, and Release. The ADSR is usually

triggered by a pulse from a keyboard controller and kept in a triggered state by another timing signal, called the gate. The trigger pulse is sent from the keyboard whenever a key is depressed, and the gate signal is high for as long as the key is held down. The timing signals don't have to come from the keyboard. They can come from a switch, if it is desired to be able to fire the ADSR independently. NOTE: most synthesizers are monophonic (one note at a time). The timing for polyphonic (more than one note at a time) machines gets rather involved and would take more space than I have to explain. When the trigger pulse reaches the ADSR, it starts increasing the voltage on its output for a time set by the attack time input voltage. When that time has elapsed, it starts decreasing its output voltage at a rate determined by the initial decay input voltage. This continues until the output voltage hits a plateau set by the sustain voltage input voltage. The output stays at this level for as long as the gate input is high. When the gate input goes low, the output starts heading down towards zero at the rate set by the release rate input voltage. The end result is an envelope output that looks like figure 2. You can use this output voltage to control frequency by putting it into the VCO control input, or you can run it into any of the control inputs on any other module.



We now have the basic modules we need to synthesize a variety of sounds. Set up as in figure 3, the modules are a more specific arrangement of the basic patch. Think of the modules as building blocks with an input, output, and control input, to be used as you desire. For the basic patch below, the sound is produced as follows: 1. The oscillators continuously put out sound. 2. A key on the keyboard is depressed. 3. The keyboard outputs trigger and gate signals to the ADSRs, and control voltages to the VCOs. 4. The ADSR connected to the VCF starts attack at a high speed. 5. The VCA's gain goes from zero to one, sending a signal out the speaker. 6. The ADSR connected to the VCF started increasing its output voltage at the same time as the other ADSR, but at a slower rate. 7. The VCF, in a low-pass mode, starts to move its cut-off frequency up from a pre-set frequency. 8. With the VCF's ADSR set for a very long release time, and 9. The VCA's ADSR set for a medium release time, 10. When the key is released, the amplitude dies slowly away. The resulting sound is a rFFWWWAAAAAaaaaaaa.... (Look, you try to describe a sound in print!).

Thus ends the synthesizer primer. If you're confused, go over it a few times. It's hard to describe something you've become very familiar with to everyone without writing a whole book. The best way to learn about synthesizers is to sit down in front of one for several hours, and play with it. The time passes very quickly. Try local schools and universities, as they may have one. Chances are, they'll be more than happy to let you use it, as most of the time, it probably sits in the corner because only a few people know how to use it. You know better than to let a few knobs scare you off. I've also got one that I built in high school (and in Pep band, screwed up Pinball Wizard on three separate occasions on). If you want to play around with it if you come up here, you're more than welcome to do so.

ROLY



POLY

230-88 Giant Hardware Kit - Contains giant hardware, just the thing for your junkbox! Contents: 12 - 3" diameter iron "shipweld" bolts, 8 matching nuts, 16 - 6" washers, 2 Lbs. Anti-Sieze compound. Shipping Wt. 600 Lbs. (Sorry, cannot be sent via airmail near North or South Poles, or near areas of high geo-magnetic flux density) your cost \$1.29/ Kit (plus shipping).

321-** Lead Balloons - 10,000 were manufactured for the U.S. Navy before a decimal place error was discovered. Use for pontoons, rolling sod, giant Pb/acid batteries, capacitors, or just flying underground. \$4000

JJ2-AX Surplus Japanese character generator ROM - this device will decode 7 bits to Japanese characters, and will drive a 120 segment display (N/A from us). \$4.25 Ea.

XC-500 LIMITED number of WWII "outdated" reconnaissance films and photos - for war games, rec room, reunions, auction fillers. Kilogram worth of these memories only \$.50

USA-65 Military Aircraft Phono Turntable - has ingeniously designed gyro-frame that compensates for sudden disturbances like turbulence or explosions. Peak vibration damping at 13Khz. \$340 Ea.

372-63 Aircraft Panel Switches - Recovered from Japanese Kamikaze planes downed in the Pacific during WWII. specify SPST, DPDT, DP, DT's, ESP's or LSD's. Good to useless condition, minor corrosion. 15/\$1.00

372-64 Panel Meters - (from same source as above). Good movements (just shake it and you'll know we weren't kidding). Some minor defects: cracked glass due to bullet holes and water pressure, missing needles, sea water inside some of the faces. Hand crafted Japanese numbered dials. NO WARRANTY .15 Ea.



222-24 NASA - Apollo Spacecraft computer chips (still crunchy!). LSMFT, DOA circuitry. Sorry, no specs or data sheets. Over 500,000 solid state devices in chip, cost U.S. Government \$50,000 each, your price 3/\$1.00

222-23 Component Extractor - extract 1000's of transistors and diodes from above chip 222-24. Consists of Electron microscope (surplus), and microcutting tool (hand model). Have great fun saving money! Cost \$40,000.95

343-77 Atlas Missile Blockhouse Power Supply Connector Plug - connects to surplus blockhouse, handles massive amounts of AC/DC power. Great conversational piece, hang on living room wall, bedroom, etc. \$1,400.00 Ea.

Sorry- a typo in our last issue of this catalog caused the surplus Atlas missile to be substituted for the Connector Plug. Those orders were thus returned for insufficient postage. The missiles were subsequently confiscated by the Government, and your name entered into an FBI file.

103-92 Digital Watch Ties - EZ to care for, mounted upside-down for easy reading. No buttons to push (hands off operation). Req. 2 "D" cells. \$107 W/case.

000-D Dark Emitting Diodes - great for non-indicators, increasing readout contrast, photo shadow fill-in, negative logic systems. 3/\$1.00



222-71B Pre-recorded wire for wire recorders (may be music, dictation, old jokes, etc.). Sorry, no selection. 500M/\$3

300-08 Fiber - Optic design rejects - strange - some defy The Laws of Physics (some don't). \$.95 Ea.

R1P-0F Plans: turn a dozen lemons into a stable, inexpensive, power supply. We tell you how you can do this with only Cu and Zn strips and spare hook-up wire! (Add more lemons in series for higher voltages). 65Pp. Complete - \$2

OLD-EE Electric Dentures - these battery powered teeth make great gifts for the aged! (This item can be used with above listed power supply). \$5/Pair.

101-01 Assorted lamp jewel lenses. Boxes of 1000. Combine with 14K gold connector lugs to make earrings, game markers - cover LEDs on your 3rd generation computer for that rustic look. \$2.50/Box

222-57 15,000,000 male banana plugs with 3" leads (one package only). \$25.00 (NOTE: cannot be shipped to Rhode Island and surrounding states).

336-36 Power and Electric cable - .05/Ft! (Sold in reels of 12,000 Ft. ONLY). Withstands 150,000 V. @ 5,000 A. (For 2 seconds). Great for rewiring the house, electric fences, anchoring ships. \$600/Reel, write for bulk prices.

000-07 Strange and wonderful "Mystery Objects" - resemble ordinary radio and TV knobs but are of German Black Forest origin, rumored to be the handicraft of hermit elves residing there (as told by the locals). Plastic, 10 for .30.

DUN-IN Used thermonuclear device detonators. Shipped in lead blister packs. Shpg. Wt. 87.5 Lbs. Bargain priced at \$50,000 each.

333-41 Microwave receiver - are you getting all you can out of your microwave oven? This converter allows you to get data communications, multiplexed TV, etc., All from your oven. Only minor modifications needed, using only a plastic nailfile (provided). Buy another oven and make an intercom, save on phone bills. Jam annoying aircraft, DX all states. Microplans only \$10.00

WUZ-AT 2,000 WATT POWER SUPPLY. Requires 2,700 "D" cells (not included). Plans \$1.00

345-67 Surplus Lighthouse Beacon - 4,000,000 candlepower. Use as nightlight, "ON" indicator, or for signaling superheroes. Shipping weight 9,000 Lbs. \$.37 Plus shipping, (in original carton).

101-01 Assorted lamp jewel lenses. Boxes of 1000. Combine with 14K gold connector lugs to make earrings, game markers - cover LEDs on your 3rd generation computer for that rustic look. \$2.50/Box



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ELECTRONICS



by Jim Lisowski, illus by Chris and Todd, art layout by Al



370-00 70W Laser - removed from Anti-Sidewinder missiles. Good for bar-b-que light-ups, reheating coffee, welding sheet metal. \$327.79 Ea.

127-13 Surplus stainless steel Pyramid Energy Generators - over 20,000 of these were commissioned for initial research. You can continue where the government left off, or use as party hats, planters, ashtrays, bookends, etc.,. 3/\$5



AJS-10 Apple Jam Sensor. Can't reveal manufacturer's name, but these multifunctional pectin/fructose sensors cost a bundle, many uses, yours for \$.35 Ea.

0600 Pre-registration registers - for administrative computers \$.90 Ea.

8HR-DA Day-Shift register - 8 in, 5 out - \$1, weak unit - 8 in, 5 out x 5 - \$3.

77777 Random CPU - uses GIGO stack, high efficiency - uses up normally unused time by executing random instructions. With 600 page users manual, only \$5.00

CHAN-9 "TV's Have Feelings Too!" This book deals with the leading cause of television failure: not alignment, not component defects, but loneliness. Tells how to watch your TV, the trouble signs, how to relate to your set. 135 Pages, Ill. Recommended by TV's everywhere. \$6.95

GUD-LK Plans: convert 2 - 55 gallon drums and surplus fiberglass insulation into a Personal Cryogenic Survival Chest that could keep you alive for 55K years or longer. \$2

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7-8LF The PIN 001 - 1 lead microcomputer. Using open end technology, this unit multiplexes data, I/O, power, status, etc.. Over one line. Pin head size, a real space saver. \$7,653 Ea.

333-78 Non-skid mats for your bathtub capacitors. High quality paper. \$.006 Ea. In 6 meg. Quantity.

888-45 Surplus Sea Anchors - for vessels over 50,000 tons. This item makes a great door prize. Send one to a friend airmail (or by ship), use to press grapes, tie the dog down, defend yourself from muggers, etc. \$1,346.98 Ea.

925-01 Naval Peanut Butter - goes good with Naval Jelly (page 7). Waterproof, for roof repairs, auto bodies, ceramic tile. 5 Lb. Unmarked jar with blank labels \$3.55 Less shipping.

925-02 Naval lint - for use with Naval peanut butter as a low density filler. \$.89/Bu.

OLD-EE Electric Dentures - these battery powered teeth make great gifts for the aged! (This item can be used with above listed power supply). \$5/Pair.



000-10 Surplus matter transfer units - not operational - but great for parts. \$35 Ea.

900-90 Air Raid Siren - start turtle races, attract giant squids, cause general panic. \$45.00 Each.

910-76 Magnesium flares - for lighting cigarettes, small scale arson, birthday cakes. Box of three for \$10.00

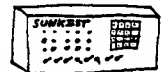
2001~ Surplus Starships - similar to U.S.S. Enterprise, 4 colors. Use for weekend trips, science fair projects. Be your own boss, rid the area of the deadly Klingon Menace, experiment with relativity, start your own TV show. Kit form only. 88,000,000,000 Interlocking parts, complete 6 page instruction/assembly manual. Assemble in your spare time - subject to FAA inspection. Write for prices.

567-76 Universal Tuning Sections. These little wonders can be used in ham gear. They tune anything. VHF, FM, Pianos, high school bands, car engines, musical saws, anything you can think of. 3/\$1.00. May cause telephone interference or time reversals.

000-D Dark Emitting Diodes - great for non-indicators, increasing readout contrast, photo shadow fill-in, negative logic systems. 3/\$1.00

MMM-mm LSI chip cookies, LSI chip ice cream - for your techie friends. May get TTL, RTL, etc. \$4.00/Lb.

R1P-OF Plans: turn a dozen lemons into a stable, inexpensive, power supply. We tell you how you can do this with only Cu and Zn strips and spare hook-up wire! (Add more lemons in series for higher voltages). 65Pp. Complete - \$2



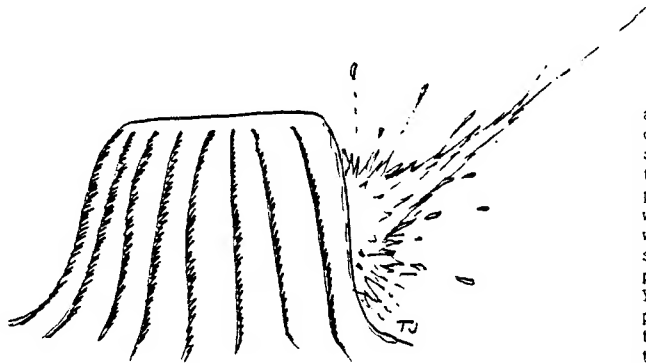
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All prices subject to increase dependant on need, all packages shipped uninsured (like us), when shipped. If you want it sooner than three months, come pick it up yourself.



we are now alone.

Here are some of the remaining parts that I did not get rid of this past summer. All the prices include postage, and I would prefer that you don't order any less than two dollars worth, postage costs being what they are.

HI03SS 50 volt, 3 amp triac, TO-5 case, 3 for a dollar. HI10103 100 volt, 3 amp SCR, sensitive gate which can be driven from TTL. TO-220 case, 3 for a dollar. 0.047MF., 250 volt, grey dipped poly caps, new, removed from boards, 20/\$1.00. 8.2K, 1 watt, 10% resistors, PC leads, 15/\$1.00. 1000MF., 10 volt electrolytic caps, 5/\$1.00. Reed switches removed from boards, 20/\$1.00. LED clip holders, no lens, 50/\$1.00. Dale PH-25-17, 120 ohm, 1%, 25 watt power resistors. Don't know if they are inductive. Removed from Burroughs equipment. Bolt down can type. 3/\$1.00. 220 Ohm, .5 Watt, 10%, 40/\$1.00. All items are in limited quantity and subject to prior sale. The stuff is cheaper at cons, because I don't have to worry about postage and handling. That's the list for those of you who requested it.



MESKLINITE BALL BEARINGS
From 'Am

LAST WRITES

To begin with, I'd like to thank Todd (my chauffeur to the computer center), Colleen (the little red-haired girl who did some proofreading for me), Chris (local artist-on-leash), and Jeff, Carol, and the rest of the Chicago bunch that did the final processing on this.

J. DUNTEMANN
6208 N. CAMPBELL
CHICAGO IL 60659

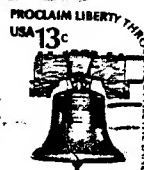
You really have to do one of these to fully appreciate what Jeff and Carol go through to put one out. I spent all my spare time this past week sitting in front of this multi-megabuck system's terminals, watching it crash five times a day, praying that it didn't wipe out the files these words were stored in. It gets to be time consuming when you have to learn how to use a computer system in a week, and your documentation processor doesn't have any documentation on it! You might be able to tell from the text that the processor still doesn't work quite right. I've got to confess that I enjoyed doing it, even though at times it got a little irritating.

Coming up in the future is Confusion. Those of you who were there last year might remember Compumart / Neumann Computer Exchange. That's the place with the \$2 Sonalerts and other good stuff. We will be organizing trips to this place on Saturday afternoon, so bring your spare cash. If you don't remember or weren't there, take a look at some of the more expensive stuff that they're advertising in the back of various magazines like PE, 73, Kilobaud, etc. Take my word that they have extremely low prices on useful electronic stuff (another example is the 3 volt, 1 amp transformers for \$1.00). Also, bring your electronic parts to trade. I'll have some once again, probably the same ones that are on the list inside. *Dax is

Heed to those words behind the Cortli, screamed the Wreath. For those of you who haven't already heard, proposal "D" last November passed (narrowly), so the drinking age in Michigan is going back up to 21 on December 22. Several court suits are currently being filed, as well as an injunction preventing it from going into effect for reasons of discrimination and unconstitutionality. Chances are, the con will be drier than usual.

Finally, on the weekend of February 2, 3, and 4, there is a major festival up here called Winter Carnival. That's when we get a chance to put all that snow to use: having dogsled races, building statues, etc. Todd and I will be holding a berserker that weekend, as there are no classes, starting on Thursday. We don't know what will happen, but spontaneity is usually more fun than planned events. Anyone who wants to come - please let us know beforehand. We have to figure out how to cram you into the apartment, and of course you'll want to know how to get here. For those of you who wish to teleport in, the coordinates for our living room at the time of this writing were: 45°05'16.67" Latitude, 88°35'04.65" Longitude. Check with the geological survey offices for any recent shifts, as we don't want you materializing inside the synthesizer or the ~~computer~~ (it gets messy).

Ⓐ FIN



Neil Preston WBODQW
7024 Bales
Kansas City MO 64132

Y
CAMPBELL
1989